



Construction - Part 2



Section #27



Construction - Part 2

➤ Change Orders

CHANGE ORDER		
PROJECT/PROJECT NUMBER		
CONTRACT/ITEM NUMBER		
ISSUED BY	DATE ISSUED	ISSUE NUMBER
PROJECT NUMBER	ISSUE NUMBER	ORIGINAL CONTRACT DATE
DATE	DATE	
CHANGE THE FOLLOWING WORK TO THE ORIGINAL CONTRACT:		

➤ Quality Assurance Program

➤ Final Inspection

➤ Traffic Control





Change Order Definition

When work is needed that is different or in addition to the work provided for in the construction contract documents

Written agreement between the contractor and the Project Sponsor modifying the existing contract

Needs prior approval from NHDOT

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7 Types of Change Orders

- Normal / Non Critical
- Critical path
- Emergency condition
- Time extension
- Non-participating
- Balance and excess
- Final balancing



The process is generally the same for each above, the time for “Emergency Condition” and “Critical Path” CO’s is less



7 Change Orders steps

- 1) Identify need
- 2) Engineer's IGE
- 3) Contractor's cost estimate
- 4) Engineer's Justification
- 5) Negotiate & submit
- 6) Wait for NHDOT approval
- 7) Execute Change Order





CO Step #1 – Identify Need

Contractor, Contract Administrator (CA), Project Engineer, or Sponsor identifies need **in writing**

Example

Contractor needs more drainage pipe:

- Needs additional 15 feet of 15" pipe (**existing contract item**)
- Needs 24 feet of 24" pipe (**Not in contract**)





CO Step #2 - Engineer's IGE

**Justify draft change order in
writing**

- Description of work
- Schedule impact
- Cost implication (IGE)
- All backup to justify need



If justified, then request price from contractor (recommended to seek NHDOT's opinion at this step)



CO Step #3 – Contractor's Cost Estimate

Price items per unit price specifications

Description	Quantity	Unit	Estimate	Actual	Balance
Labor					
Interior Direct	50.00	per unit	3000.00	0.00	3000.00
Interior Trade Labor	100.00	estimate	1000.00	0.00	1000.00
Interior Trade Materials	100.00	estimate	1000.00	0.00	1000.00
Interior Cleanups	100.00	estimate	1000.00	0.00	1000.00
Site System Labor	100.00	estimate	1000.00	0.00	1000.00
Site System Materials	100.00	estimate	1000.00	0.00	1000.00
Materials					
Hardwood Flooring Labor	2.00	per sq	1400.00	0.00	1400.00
Hardwood Flooring Materials	2.00	per sq	1400.00	0.00	1400.00
Hardwood Flooring Labor	2.00	per sq	1400.00	0.00	1400.00
Hardwood Flooring Materials	2.00	per sq	1400.00	0.00	1400.00
Hardwood Flooring Labor	2.00	per sq	1400.00	0.00	1400.00
Hardwood Flooring Materials	2.00	per sq	1400.00	0.00	1400.00
Carpet Labor	100.00	per sq	1000.00	0.00	1000.00
Carpet Materials	100.00	per sq	1000.00	0.00	1000.00
Site & General					
Site & General Labor	2.00	per sq	1400.00	0.00	1400.00
Site & General Materials	2.00	per sq	1400.00	0.00	1400.00
Site & General Labor	2.00	per sq	1400.00	0.00	1400.00
Site & General Materials	2.00	per sq	1400.00	0.00	1400.00
Site & General Labor	2.00	per sq	1400.00	0.00	1400.00
Site & General Materials	2.00	per sq	1400.00	0.00	1400.00
Overhead & Profit					
Overhead & Profit Labor	2.00	per sq	1400.00	0.00	1400.00
Overhead & Profit Materials	2.00	per sq	1400.00	0.00	1400.00
Overhead & Profit Labor	2.00	per sq	1400.00	0.00	1400.00
Overhead & Profit Materials	2.00	per sq	1400.00	0.00	1400.00
Overhead & Profit Labor	2.00	per sq	1400.00	0.00	1400.00
Overhead & Profit Materials	2.00	per sq	1400.00	0.00	1400.00

Example contractor change order price installed per foot

- \$10 per foot for 15" pipe
- \$20 per foot for the 24" pipe

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CO Step #4 – Engineer's Justification

Are unit prices reasonable?

- Existing Contract Item (15" pipe)
Verify change order unit price (\$10/FT) is close to existing contract unit price.
If CO quantity is significantly more than base bid quantity? Then change order unit price should come down.
- New Contract Item (24" pipe)
Review and document weighted average unit prices and/or other similar projects for comparison to contractors change order price.



CO Step #5 – Negotiate & Submit

Similar to scope & fee

- Discuss any differences in scope or understanding of the proposed CO
- Negotiate among Contractor, Sponsor, Contract Administrator and Project Engineer to determine cost
- **Document and submit draft CO & IGE to NHDOT for review and approval**





CO Step #6 – Wait for Approval

NHDOT process

- Review draft CO
- Discuss with FHWA
- Request additional funds from NHDOT Program Manager and FHWA



NHDOT process can take time and no change order work can begin until NHDOT approval in writing



CO Step #7 – Execute Change Order

- All parties sign the Change Order per the contract documents
- **Copy the NHDOT on the signed executed document**
- We prefer hard copy and PDF





Emergency and Critical Path CO's

Same Process but Expedited

- **Emergency**: Imminent danger or unsafe condition
- **Critical Path**: Item will delay the project based on CPM project schedule
- **Still need NHDOT prior approval**
- **See LPA Manual Section #27 for more information**



Time Extension and Non-Participating CO's

- **Contract Time Extensions**: Need to be documented and approved by NHDOT *Liquidated damages may come into play for additional CE time*
- **Non-Par Changes**: Need to be tracked by NHDOT and included in the overall project costs



Balance & Excess CO's

Change Orders Along the Way

- NHDOT requires comparing the contract item totals with the installed quantities at the 25%, 50%, 75% and 90% stages of a project
- This helps to identify the need for additional funds early and gives time to run a balance and excess change order if necessary



Final Balancing CO

Final Change Order at project completion

- Documents final pay quantities for every item constructed
- It is too late to ask for additional funds at this point in time
- **Change Orders need to be approved prior to that work beginning**

Construction - Part 2

- Change Orders
- **Quality Assurance Program**



- Final Inspection
- Traffic Control





Quality Assurance Program

Basics:

- **Acceptance Testing:**
Done by Construction Engineer
- **Independent Assurance Testing:**
Done by NHDOT Bureau of M&R
- **Both shall follow QAP document titled:**
*"NHDOT Quality Assurance
Program for Municipally Managed
Federal-Aid Projects"*

Found in Appendix #21 and handouts



Quality Assurance Program

Construction Engineer

- Fills out *Quality Assurance Program Information Form (see handout)* based on items in contract (concrete, asphalt, etc...)
- Submits form to NHDOT Bureau of M&R at beginning of construction phase
- Follows testing guidance in document





Quality Assurance Program

Frequency of testing example

Material	Property	Test	Acceptance test by CE	Assurance test by NHDOT
304.1 Sand	Compaction	AASHTO T191, T310, or Test Strip	In Place 1/1,200 CY	One CE Test with NHDOT present (within last calendar year)

Assurance Testing is mostly “testing the tester”

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Quality Assurance Program

Certifications for Testers

- **Soil and Asphalt Testers** need Certification from **NETTCP** (North East Transportation Training & Certification Program)
- **Concrete Testers** need Certification from **NETTCP** or **ACI** (American Concrete Institute)





Quality Assurance Program

Project records

- A **“Lab Book”** shall be part of project records that has documentation of tests performed and test results
- The CE must certify at the end of the project that materials incorporated into the work were in conformance with plans and specifications



**See handout for sample
Certification Form**

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Quality Assurance Program

Qualified Products List

Some items are prequalified for quality:

Example:

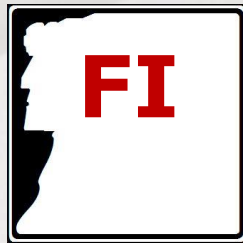
Item #559 - Asphaltic Plug Expansion Joint

559.2.1 – “The expansion joint shall be one of the products listed on the Qualified Products List”

www.nh.gov/dot/org/projectdevelopment/materials/research/products.htm

Construction - Part 2

- Change Orders
- Quality Assurance Program
- Final Inspection



- Traffic Control

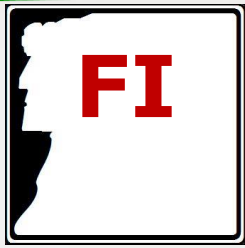


Final Inspection

Who to Invite?

- Sponsor, CE, Contract Administrator, Contractor, NHDOT Project Manager and FHWA
- Also, NHDOT Highway Maintenance if NHDOT will have maintenance responsibility





Final Inspection

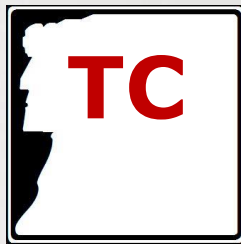
Punch List ... then Complete & Accept letter

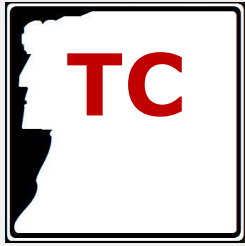
- Inspect project for flaws, incomplete work and needed changes
- Contract Administrator generates **Punch List**
- Once Punch List is satisfactorily completed, Sponsor issues **Complete and Accepted letter** with **date** the project was turned over to the Project Sponsor and maintenance begins



Construction - Part 2

- Change Orders
- Quality Assurance Program
- Final Inspection
- **Traffic Control**

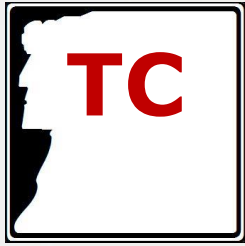




Why Work Zone Traffic Control ?



SECTION #23



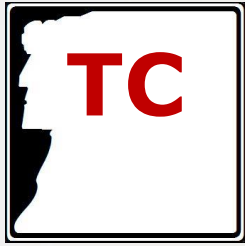
Traffic Control

**Work zones
create unexpected
conditions for the travelling
public which can harm
construction workers,
cause traffic crashes,
injuries and/or fatalities**



W21-1a

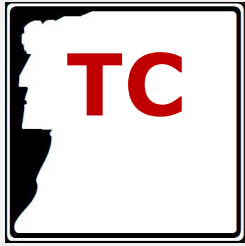
SECTION #23



Goals for Work Zone Traffic Control

- Protect construction workers
- Protect the travelling public
- Provide acceptable levels of traffic capacity for the travelling public
- Maintain access to abutters
- Provide flexibility based on work zone operations
- Follow **Manual of Uniform Traffic Control Devices (MUTCD)**





Work Zone Considerations

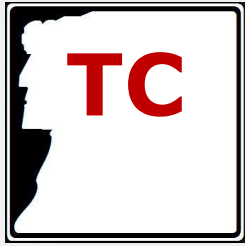
2 Questions to ask:

- What are you doing?
“the construction operation”
- Where are you doing it?
“the transportation setting”



W20-7a

SECTION #23



Work Zone Considerations

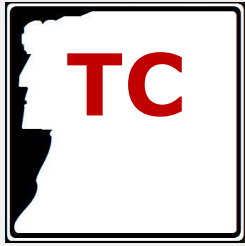
Operational Considerations:

- Width and length of work zone
- Duration of work
- Time of work (night vs. day)
- Rolling operation or stationary
- Type of construction equipment
- Where will the drainage go?



W20-7a

SECTION #23

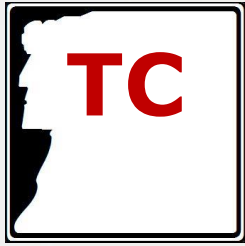


Work Zone Considerations

Setting Considerations:

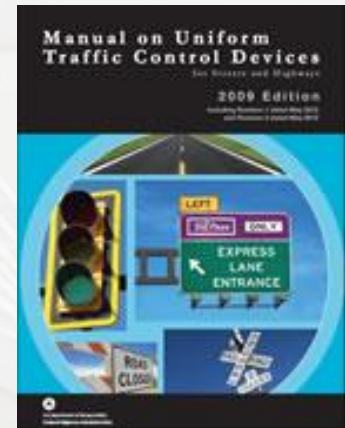
- Type or class of roadway
- Traffic volumes
- Roadway geometry / sight lines
- Speed of traffic
- Other Traffic: Pedestrians / Bikes / Trains / Boats / Airports / Railroads?
- Business access
- Other nearby work zones

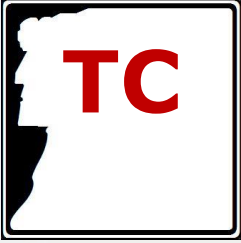




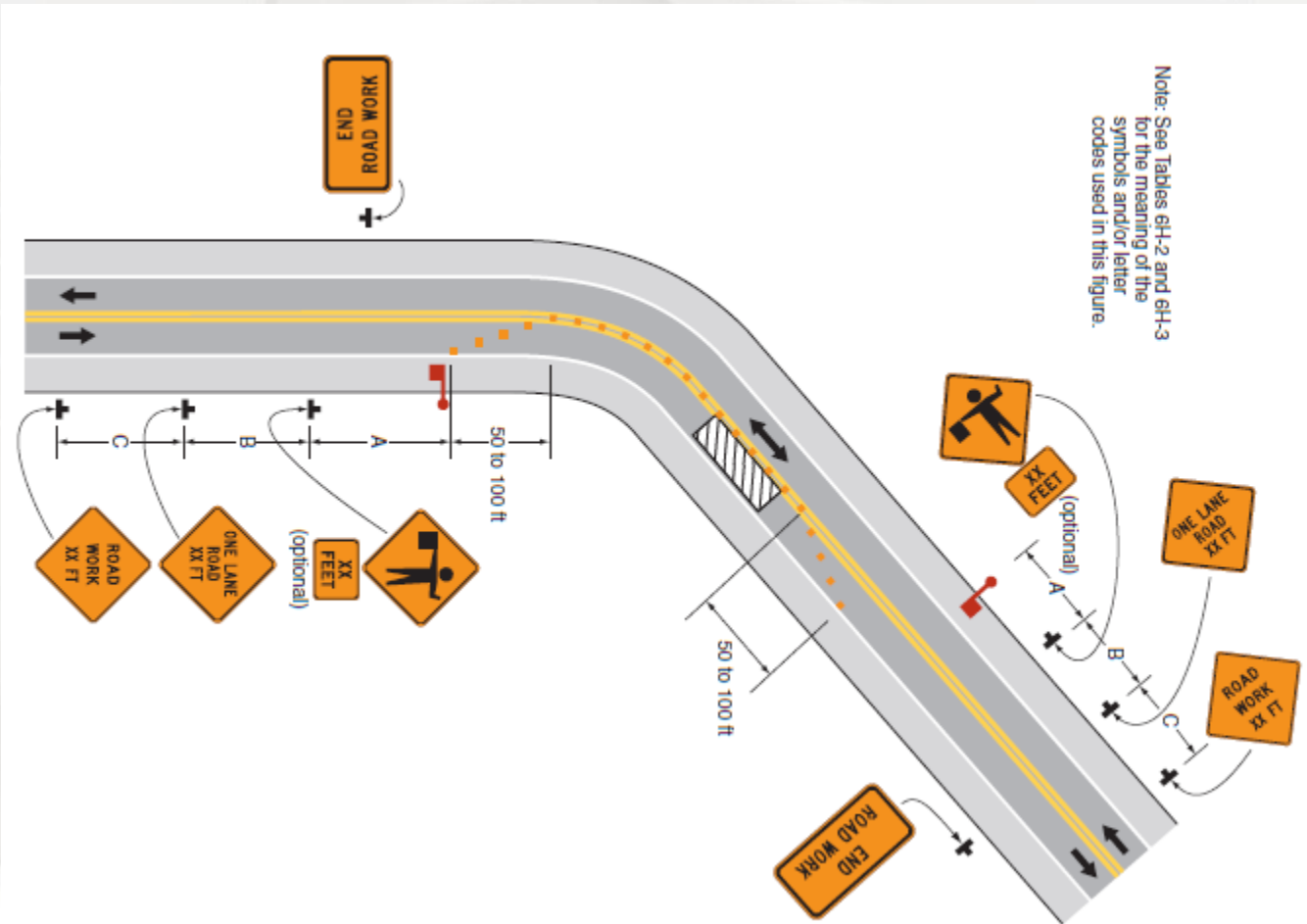
Work Zone Traffic Control Plan

- A project specific **Traffic Control Plan (TCP)** shall be developed as part of the design process
- The **TCP** shall be based on standard sequences of signs or other traffic control devices as shown in **NHDOT Highway Design Manual & MUTCD Part 6 - Temporary Traffic Control**





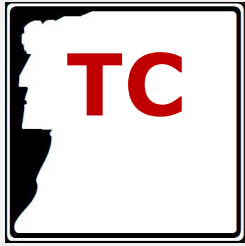
Work Zone Traffic Control Plan



**Alternating
one way
traffic with
flaggers**

**MUTCD
Figure
6H-10**

SECTION #23

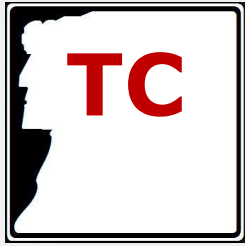


Traffic Control Inspection

During construction the Contract Administrator should make frequent reviews of actual traffic control installations



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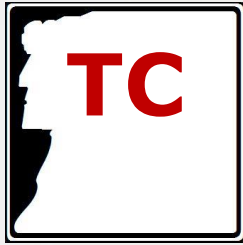
Work Zone Traffic Control

DO's

- Clean signs
- High reflectivity
- Good condition
- Fresh temporary pavement markings

DONT's


- Dirty / broken signs
- Missing reflectivity
- Spray paint on plywood
- Duct tape on signs
- Faded temporary pavement markings



Traffic Control Web Links

Doing business section

[Doing Business with DOT](#) > Engineers/Consultants



Information for Engineers and Consultants

Engineers and consultants doing business with the New Hampshire Department of Transportation will find links to business and technical information listed below.

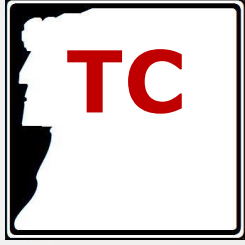
*For more information contact:
NH Department of Transportation
(603) 271-3734*

Business Information

Consultant Selection <ul style="list-style-type: none">▪ Consultant Selection Information▪ Eligible Consultant List▪ Possible Action Projects – For Information Only▪ Projects Soliciting for Interest▪ Short List Projects	Labor Compliance and Civil Rights <ul style="list-style-type: none">▪ DBE and Minority/Women Owned Business Information▪ DBE Directory▪ DBE for Airport Projects▪ Labor Compliance and Civil Rights
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Scroll to
bottom
right,
Work
Zone
Safety

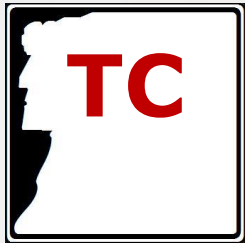
<http://www.nh.gov/dot/business/engineers.htm>



Important Traffic Control Links

NHDOT Website Links

- 1) Law Enforcement Training requirement
- 2) Law Enforcement & Flagger Policy
- 3) Work Zone Safety and Mobility Policy
 - Traffic Control Committee
 - Work Zone Crash Report requirement



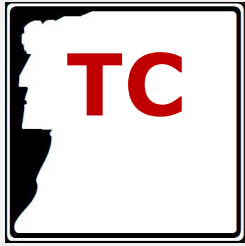
Link #1 - Law Enforcement Training Requirement



Correct Paddles

See handout for training info

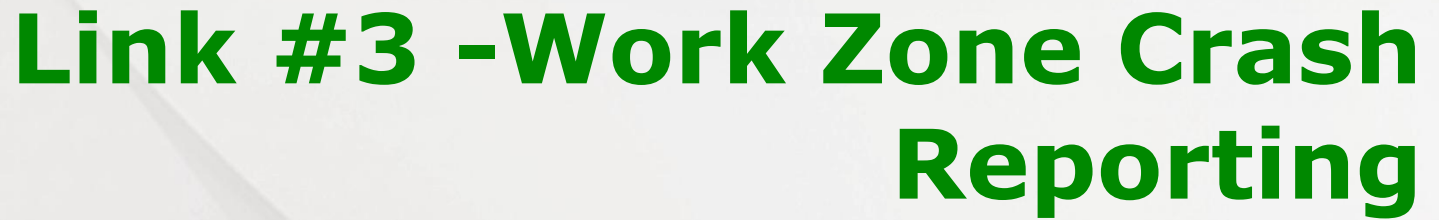
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Link #2 - NHDOT Flagger and Law Enforcement Policy

- Provides guidance for use of flaggers and uniformed officers
- Purpose is to maintain the highest level of safety and reduce costs
- LPA shall follow policy

See handout for copy of policy



- | <h2 style="margin: 0;">NEW HAMPSHIRE DEPARTMENT OF TRANSPORTATION</h2> <h3 style="margin: 0;">WORK ZONE TRAFFIC CRASH REPORT</h3> <p style="margin: 0; font-size: small;">(This form is to be submitted for each crash report.)</p> | | | | | | | | | |
|---|---|--|--------------------------|---------------------------|--------------------------|--|--------------------------|--------------------------|--------------------------|
| 1. Town or City: | | 2. Roadway Condition: | | | | 3. Weather Condition: | | | |
| <input type="text"/> | | <input type="checkbox"/> normal <input type="checkbox"/> icy <input type="checkbox"/> foggy
<input type="checkbox"/> wet <input type="checkbox"/> dry <input type="checkbox"/> snow | | | | <input type="checkbox"/> clear <input type="checkbox"/> rain <input type="checkbox"/> ice
<input type="checkbox"/> drizzle <input type="checkbox"/> sleet <input type="checkbox"/> wind | | | |
| 4. Project Number: | | 5. Surface Conditions: | | | | | | | |
| <input type="text"/> | | <input type="checkbox"/> dry <input type="checkbox"/> wet <input type="checkbox"/> icy
<input type="checkbox"/> rough <input type="checkbox"/> smooth <input type="checkbox"/> uneven | | | | | | | |
| 6. Material: | | 7. Light Conditions: | | | | | | | |
| <input type="checkbox"/> Edge Enhancement <input type="checkbox"/> Design Grade
<input type="checkbox"/> Impact Barrier <input type="checkbox"/> Traffic Control | | <input type="checkbox"/> day <input type="checkbox"/> night <input type="checkbox"/> dawn
<input type="checkbox"/> dusk <input type="checkbox"/> moon <input type="checkbox"/> stars | | | | | | | |
| 8. Other: | | 9. Weather Conditions: | | | | | | | |
| <input type="text"/> | | <input type="checkbox"/> clear <input type="checkbox"/> rain <input type="checkbox"/> ice <input type="checkbox"/> fog <input type="checkbox"/> snow
<input type="checkbox"/> drizzle <input type="checkbox"/> sleet <input type="checkbox"/> wind <input type="checkbox"/> hail <input type="checkbox"/> sun | | | | | | | |
| 10. Crash Date: | | 11. Crash Time: | | | | | | | |
| <input type="text"/> | | <input type="text"/> | | | | | | | |
| 12. Number of Vehicles Involved: | | 13. Pooled Speed Limit: | | | | | | | |
| <input type="text"/> | | <input type="text"/> | | | | | | | |
| 14. Number of Persons Injured and Fatalities: | | 15. Traffic Control Package: | | | | | | | |
| <input type="text"/> | | <input type="checkbox"/> normal <input type="checkbox"/> full <input type="checkbox"/> no <input type="checkbox"/> other | | | | | | | |
| 16. In Motor Vehicle: | | 17. In Motorcycle: | | 18. In Pedestrian: | | 19. In Bicyclist: | | 20. In Other: | |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 21. Location of Crash: | 22. Permitted Markings: | | | | | | | | |
| COUNTY: | INTERSTATE: | INTERSTATE ROAD: | STATE ROAD: | LOCAL ROAD: | TRUCK STOP: | TRUCK STOP: | TRUCK STOP: | TRUCK STOP: | TRUCK STOP: |
| <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> |
| 23. Location of Crash: | 24. Lane Width: | | | | | | | | |
| <input type="text"/> | <input type="checkbox"/> 12' <input type="checkbox"/> 14' <input type="checkbox"/> 16' <input type="checkbox"/> 18' <input type="checkbox"/> 20' <input type="checkbox"/> 22' <input type="checkbox"/> 24' <input type="checkbox"/> 26' <input type="checkbox"/> 28' <input type="checkbox"/> 30' | | | | | | | | |
| 25. Type of Crash or Collision with the following vehicle(s): | 26. Lane Width: | | | | | | | | |
| <input type="checkbox"/> rear-end <input type="checkbox"/> side-impact <input type="checkbox"/> head-on
<input type="checkbox"/> rear-end <input type="checkbox"/> side-impact <input type="checkbox"/> head-on
<input type="checkbox"/> rear-end <input type="checkbox"/> side-impact <input type="checkbox"/> head-on | <input type="checkbox"/> 12' <input type="checkbox"/> 14' <input type="checkbox"/> 16' <input type="checkbox"/> 18' <input type="checkbox"/> 20' <input type="checkbox"/> 22' <input type="checkbox"/> 24' <input type="checkbox"/> 26' <input type="checkbox"/> 28' <input type="checkbox"/> 30' | | | | | | | | |
| 27. Other: | 28. Shoulder Width: | | | | | | | | |
| <input type="text"/> | <input type="checkbox"/> 12' <input type="checkbox"/> 14' <input type="checkbox"/> 16' <input type="checkbox"/> 18' <input type="checkbox"/> 20' <input type="checkbox"/> 22' <input type="checkbox"/> 24' <input type="checkbox"/> 26' <input type="checkbox"/> 28' <input type="checkbox"/> 30' | | | | | | | | |
| 29. Roadway Design: | 30. Roadway Design: | | | | | | | | |
| <input type="text"/> | <input type="checkbox"/> 12' <input type="checkbox"/> 14' <input type="checkbox"/> 16' <input type="checkbox"/> 18' <input type="checkbox"/> 20' <input type="checkbox"/> 22' <input type="checkbox"/> 24' <input type="checkbox"/> 26' <input type="checkbox"/> 28' <input type="checkbox"/> 30' | | | | | | | | |
| 31. Roadway Design: | 32. Roadway Design: | | | | | | | | |
| <input type="text"/> | <input type="checkbox"/> 12' <input type="checkbox"/> 14' <input type="checkbox"/> 16' <input type="checkbox"/> 18' <input type="checkbox"/> 20' <input type="checkbox"/> 22' <input type="checkbox"/> 24' <input type="checkbox"/> 26' <input type="checkbox"/> 28' <input type="checkbox"/> 30' | | | | | | | | |
| 33. Roadway Design: | 34. Roadway Design: | | | | | | | | |
| <input type="text"/> | <input type="checkbox"/> 12' <input type="checkbox"/> 14' <input type="checkbox"/> 16' <input type="checkbox"/> 18' <input type="checkbox"/> 20' <input type="checkbox"/> 22' <input type="checkbox"/> 24' <input type="checkbox"/> 26' <input type="checkbox"/> 28' <input type="checkbox"/> 30' | | | | | | | | |
| 35. Roadway Design: | 36. Roadway Design: | | | | | | | | |
| <input type="text"/> | <input type="checkbox"/> 12' <input type="checkbox"/> 14' <input type="checkbox"/> 16' <input type="checkbox"/> 18' <input type="checkbox"/> 20' <input type="checkbox"/> 22' <input type="checkbox"/> 24' <input type="checkbox"/> 26' <input type="checkbox"/> 28' <input type="checkbox"/> 30' | | | | | | | | |
| 37. Roadway Design: | 38. Roadway Design: | | | | | | | | |
| <input type="text"/> | <input type="checkbox"/> 12' <input type="checkbox"/> 14' <input type="checkbox"/> 16' <input type="checkbox"/> 18' <input type="checkbox"/> 20' <input type="checkbox"/> 22' <input type="checkbox"/> 24' <input type="checkbox"/> 26' <input type="checkbox"/> 28' <input type="checkbox"/> 30' | | | | | | | | |
| 39. Roadway Design: | 40. Roadway Design: | | | | | | | | |
| <input type="text"/> | <input type="checkbox"/> 12' <input type="checkbox"/> 14' <input type="checkbox"/> 16' <input type="checkbox"/> 18' <input type="checkbox"/> 20' <input type="checkbox"/> 22' <input type="checkbox"/> 24' <input type="checkbox"/> 26' <input type="checkbox"/> 28' <input type="checkbox"/> 30' | | | | | | | | |
| 41. Roadway Design: | 42. Roadway Design: | | | | | | | | |
| <input type="text"/> | <input type="checkbox"/> 12' <input type="checkbox"/> 14' <input type="checkbox"/> 16' <input type="checkbox"/> 18' <input type="checkbox"/> 20' <input type="checkbox"/> 22' <input type="checkbox"/> 24' <input type="checkbox"/> 26' <input type="checkbox"/> 28' <input type="checkbox"/> 30' | | | | | | | | |
| 43. Roadway Design: | 44. Roadway Design: | | | | | | | | |
| <input type="text"/> | <input type="checkbox"/> 12' <input type="checkbox"/> 14' <input type="checkbox"/> 16' <input type="checkbox"/> 18' <input type="checkbox"/> 20' <input type="checkbox"/> 22' <input type="checkbox"/> 24' <input type="checkbox"/> 26' <input type="checkbox"/> 28' <input type="checkbox"/> 30' | | | | | | | | |
| 45. Roadway Design: | 46. Roadway Design: | | | | | | | | |
| <input type="text"/> | <input type="checkbox"/> 12' <input type="checkbox"/> 14' <input type="checkbox"/> 16' <input type="checkbox"/> 18' <input type="checkbox"/> 20' <input type="checkbox"/> 22' <input type="checkbox"/> 24' <input type="checkbox"/> 26' <input type="checkbox"/> 28' <input type="checkbox"/> 30' | | | | | | | | |
| 47. Roadway Design: | 48. Roadway Design: | | | | | | | | |
| <input type="text"/> | <input type="checkbox"/> 12' <input type="checkbox"/> 14' <input type="checkbox"/> 16' <input type="checkbox"/> 18' <input type="checkbox"/> 20' <input type="checkbox"/> 22' <input type="checkbox"/> 24' <input type="checkbox"/> 26' | | | | | | | | |

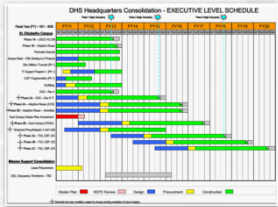
SECTION #23



Construction - Part 1

Re-Cap

- Preconstruction Meeting
- Contractors CPM Schedule
- Oversight & Inspection
- Project Records
- Construction Reimbursement



Section #27



Construction - Part 2

Re-Cap

➤ Change Orders

CHANGE ORDER		
PROJECT/SECTION NUMBER		
DATE/PROJECT NAME		
ISSUED BY	DATE	ISSUE NUMBER
PROJECT NUMBER	ISSUE NUMBER	ISSUE NUMBER
DATE	DATE	DATE
CHANGE THE FOLLOWING WORK TO THE ORIGINAL CONTRACT:		

➤ Quality Assurance Program

➤ Final Inspection

➤ Traffic Control





Construction

Questions?

Next Up: Project Ending

